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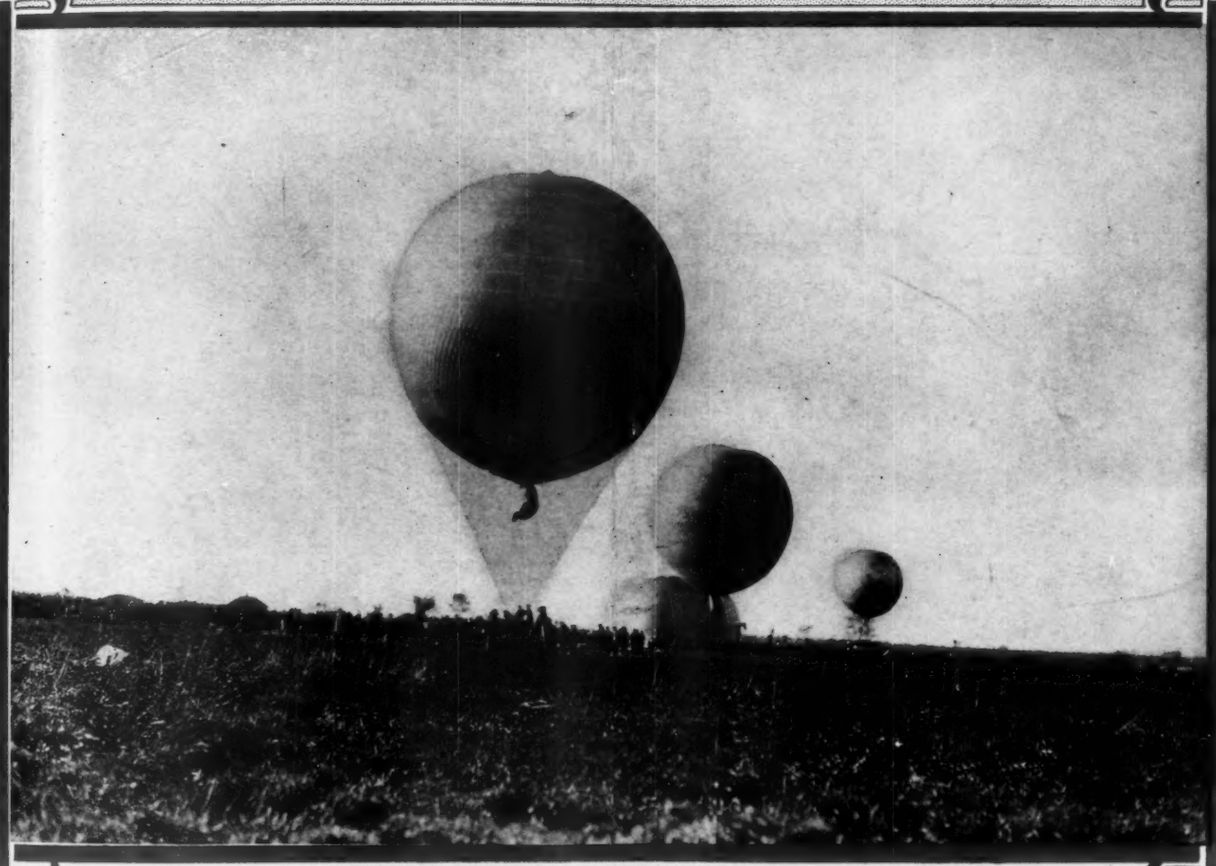

The Start of the National Elimination Balloon Race

VOLUME XVIII

NUMBER 20

SPECIAL FEATURES

THE WACO MODEL 9

HOUSING THE AIR MAIL

STABILITY AND CONTROLLABILITY OF AIRPLANES

GARDNER PUBLISHING CO., INC.
HIGHLAND, N. Y.
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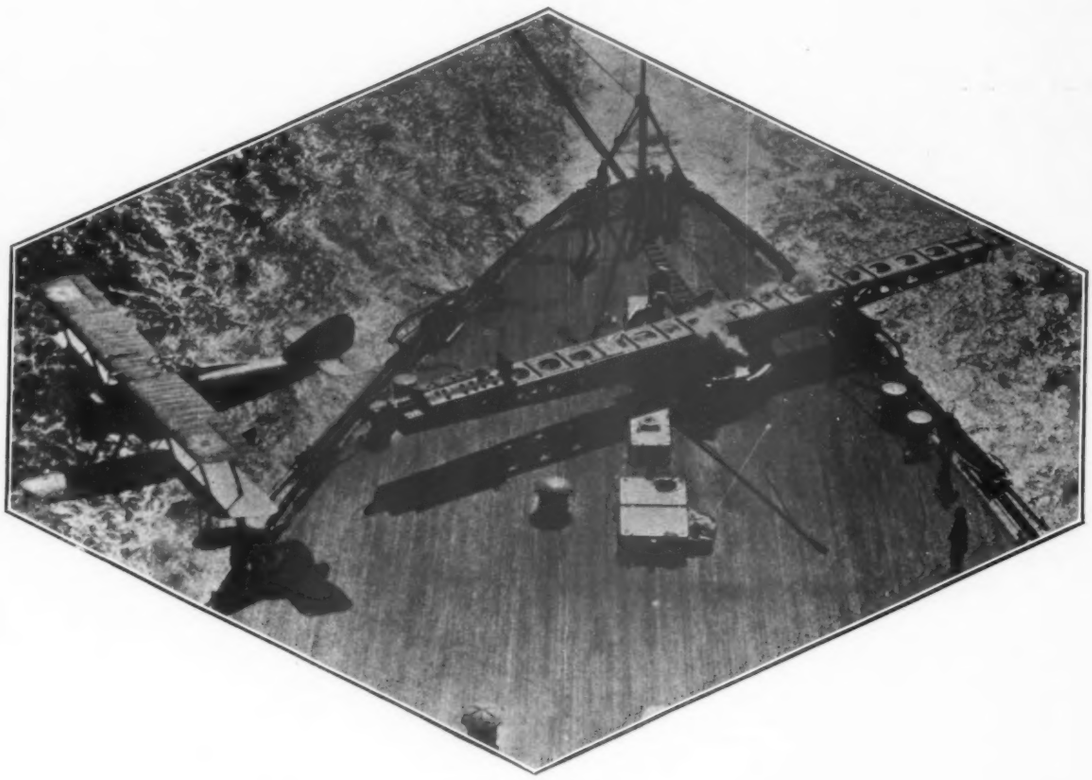

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MAY 18, 1925

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VOL. XVIII. NO. 20

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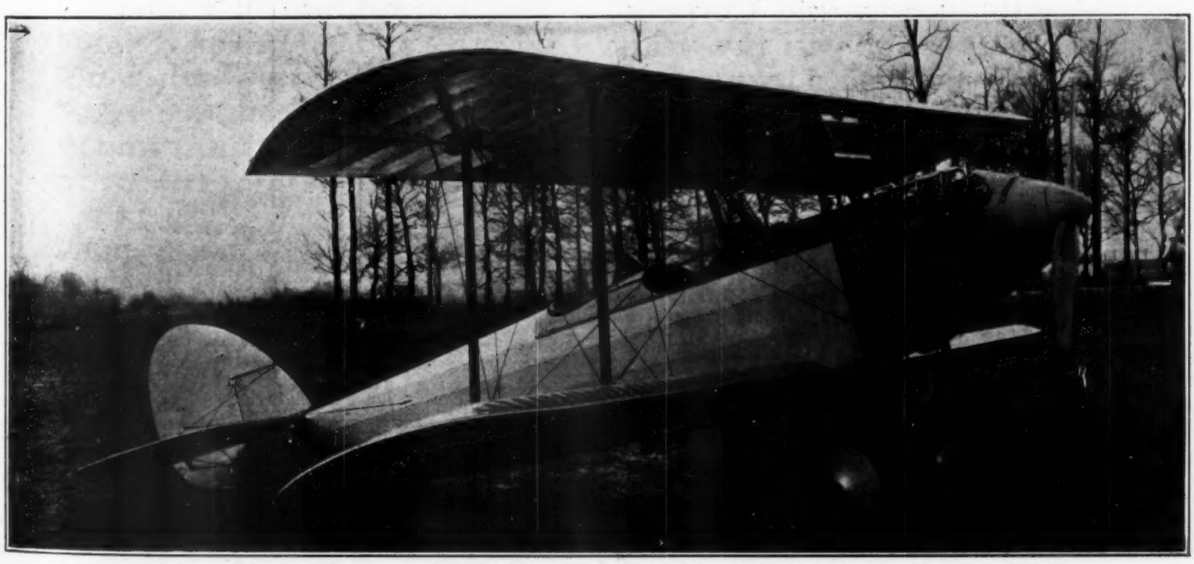
THE NEW STEEL WACO



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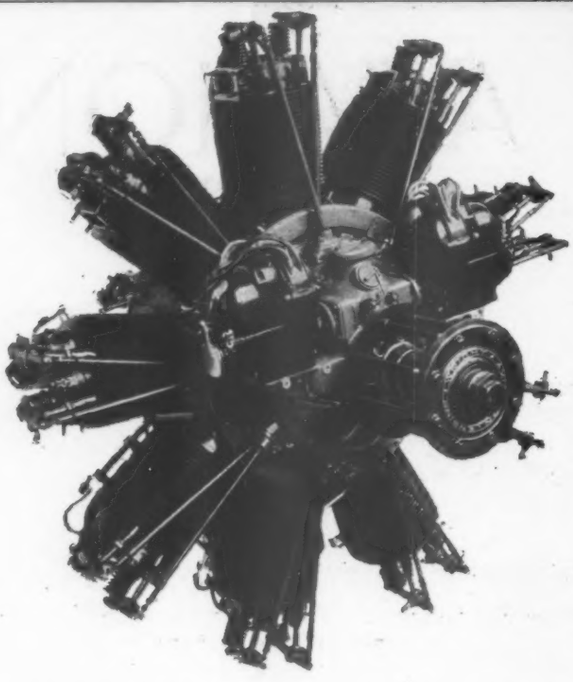

THE WRIGHT J-4 AIR-COOLED AERONAUTICAL ENGINE

AERONAUTIC engineers for years past would have used air-cooled aeronautical engines had they been as fully developed as water-cooled.

In recognition of this fact the Wright Aeronautical Corporation has, for the past two years given major consideration to the development of the "Whirlwind" series air-cooled engine—culminating in the present Wright J-4 model.

Governmental and commercial engineers, both American and foreign, watching this advance realize that they can now obtain in the Wright J-4 all the many advantages of an air-cooled power plant.

It is significant that after exhaustive and comparative study of various engines (both water and air-cooled) a company that is undertaking the most important commercial project in America has finally placed their orders for Wright J-4 engines.

Bulletin No. 8 fully describing the Wright J-4 engine, together with specifications etc. will be mailed upon request.

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Saves weight in power plant and plane.
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VOL. XVIII MAY 18, 1925 No. 20

The First Wright Airplane

WHEN scientific experts become partisans and propogandists any kind of statements may be expected. In court work the testimony of partisan scientific experts may be secured on every side of almost any question, no matter how greatly it is opposed to the public good. Government scientific men and institutions are supposed to keep clear of this sort of favoritism. But affection for Professor Langley and pride in the achievements of the Smithsonian Institution has brought about a situation that raises a question as to the scientific proprieties. If Langley had not been secretary of the Smithsonian, it is unthinkable that the persistent efforts would have been made to perpetuate an erroneous conception in the public mind. He would have been relegated to an honored position in the list of pioneers in human flight. Instead, for the last ten years, there has been constant and seemingly deliberate efforts made to place the name of Langley ahead of the Wrights in the honors of discovering a method and a means to fly. So powerful have been the political and departmental influences behind these attempts that even the Army named its greatest field and what was then intended to be its great experimental station, Langley, while a storage depot bears the name of Wright; in the Navy, the first airplane carrier is called The Langley while a balloon mother ship is known as The Wright.

There is little need to recount how the original Langley airdrome was removed for the purposes of the tests. It is enough to know that it was done. On its return to the museum it was given a label that would impress the uninformed that it was the first successful airplane.

For many years it has been no secret that the original Wright airplane would not be entrusted to The Smithsonian so long as the influences that had conducted the Langley propaganda in this country were in charge. At one time it was thought that Dayton might erect a shrine for this most famous of its possessions. But now that Orville Wright has decided to send it to an English Museum the public may awake to some of the damage done by the zeal of Langley's friends. It is to be hoped that the removal to England is only as a loan and that some day the most prized of all aeronautical possessions will find its final home in a national scientific shrine.

Landing Fields and Community Development

THE Government is not planning to furnish flying fields and equipment to Air Mail contractors who operate new Air Mail routes. To supply a completely equipped airway will probably make the capital investment prohibitive. They will depend on the communities they serve to assist them. Many communities throughout the country have realized this and have taken steps to acquire an airport. Unless there are safe airports for the contractors' planes to use, it is very unlikely that contracts will be awarded. The Government can not afford to permit the mails to be subjected to unnecessary risks.

However there are bound to be worthwhile routes which will pass over communities without landing fields. In such cases the contractor will very likely be forced to purchase or lease a field. As the contractor's capital may be limited, he will locate his field away from the town where real estate is cheap. When an Air Mail route has been established for a term of years, the town itself may tend to expand toward the field.

The growth of the use of the automobile has been made possible only by the great impetus it has given to road building by the national government, by states and by cities. This form of subsidy has been borne by the entire people by taxation. Direct taxes on automobile sales and for licenses have been an important factor in raising the funds to be spent for roads. The larger part, however, has come from general taxes. It is probable that some such plan will ultimately be devised for the development of landing fields. As this appears to be a local function, cities may furnish the fields, states the branch airway facilities and emergency landing fields and the national government the main trunk line, airway beacons and other aids to flying.

World Speed Records

SO long as the landing speed requirement in this country for racing planes is limited to seventy-five miles per hour the world speed record may remain abroad. There, the landing speed may be very much higher, the principal thought being flying speed. The basic ideas behind the construction of speed planes here and abroad are very different.

Our racing planes are built by the Army and Navy to test new features that may later be incorporated in pursuit planes. They are usually intended to compete in the Pulitzer Race and landing speeds of over seventy-five miles per hour would require not only very carefully prepared landing fields but a course where emergency landings could be made with some degree of safety.

Abroad, constructors build their own speed planes to enhance their prestige with the ultimate purpose of selling faster machines to the government. The landing speed element is not regarded as important as it is here. Therefore, when comparisons are made between the ability of aeronautical engineers and designers here and abroad, the limitations imposed on their designs should be considered.

There is not the slightest doubt but that American aeronautical engineers could produce airplanes with a speed that would surpass the existing world records if they were unhampered by landing speed requirements.

The Waco Model 9

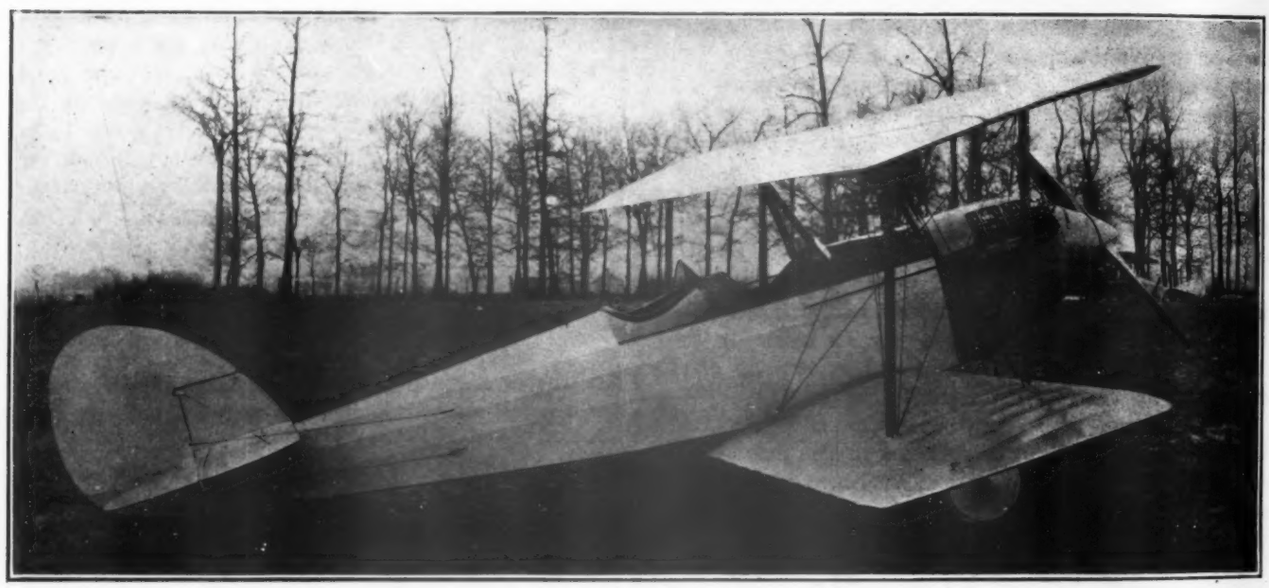
A New Three-Place OX5 Engined Commercial Airplane Produced by the Advance Aircraft Co.

The latest production of the Advance Aircraft Company is a new three-place biplane designed for commercial work by Clayton J. Brukner and Elwood J. Junkin. The primary thought in its conception has been to produce a truly efficient plane powered with the Curtiss OX5 which would possess weight carrying capabilities and maneuverability together with a sufficient speed range to meet the demands of the commercial operator and private owner.

The result is a plane of remarkable performance characteristics, simplicity, strength and ease of control. The construction has been so simplified both as to general design and detail that a plane with increased earning capacity, sturdy construction, ease of maintenance and repair, yet with a good performance might be built at a minimum cost. That such results have been attained is due to the careful attention to all details and the correct co-ordination of accepted good practice with the latest aerodynamic shapes. The simplicity of the plane, not only reduces the cost to the manufacturer and brings the selling price to within the reach of the average flier, but greatly facilitates its operation and repair. It is very compact, having a span of only 29 ft. This reduction of span is directly ascribable to the wing curve which is employed and which has been used on Waco airplanes for the last four years. This wing curve has a remarkable high lift and efficiency.

The main cellule is made up of two upper wings which are mounted together to a central cabane of streamline steel tubing, and two lower wings which are mounted directly on to the fuselage. The bracing is by means of twelve main lift and antilift cables together with streamline steel tube interplane struts. The reduction of the number of parts is due to the single bay bracing made possible by the use of a moderately thick high lift wing section which permits of deep spars and a minimum of wing surface. The resulting reduction in weight, resistance and overall dimensions serves to increase performance as well as to reduce housing difficulties. Ailerons are mounted on the upper wings, and are of sufficient size to insure ample lateral control of stalling speed. They are actuated by a simple, direct, easily operated control of proven merit.

The spars of the wings are of spruce of generous section, routed to I section where possible and left rectangular where subjected to the greatest stress. The wing ribs are of the Pratt truss type accurately formed of spruce battens and struts joined with three-ply mahogany gussets. Nose ribs are of channel section duraluminum. Adequate internal bracing struts and wires preserve the truth of the wings, and broad three-ply sidewalks extend to the trailing edge of both lower wings. The wings and ailerons are spar varnished before covering and metal fittings enameled. The wing



A side view of the new Waco

The performance characteristics are interesting, but do not reveal the most important phase of the ship's performance, which is its marked ability to climb at high angle of attack and slow speed of advance, a characteristic which is very acceptable to those operating from small fields. The ship has repeatedly demonstrated its ability to take the full load of 800 lb. off the ground in 186 ft. of run. The take off with the pilot alone has been measured at 75 ft. The climb with full load has been measured at 550 ft./min. The slow speed with a load of 500 lb. was found to be 31 mi./hr. The high speed using an ordinary toothpick propeller is 92.5 mi./hr. However, when using a new design Hartzell propeller, the speed was measured at 99.2. The useful load for which the machine was designed, is 800 lb. However, loads as high as 1,250 lb. have been taken off the ground, and the ship still possessed good climb and control.

covers are made of government specification mercerized cotton, and are doped with special aluminum pigmented dope and finished with two coats of clear spar varnish.

The fuselage is of steel tubular construction throughout and is extremely sturdy, special attention having been given to the distribution of lift and landing strains. It has been designed to withstand the continued abuse of commercial flying and incorporates a number of features which add to the ease of maintenance.

Substantial aluminum cowling is fitted around the engine and cockpits. Reinforcements are provided to guard against vibration and the strains incident to entering and leaving the cockpits. The engine cowling is neatly streamlined on to a large spinner of aluminum which is mounted back of the propeller. A propeller spinner is also fitted, which completes the streamline. An ordinary toothpick propeller is used, and

the propeller spinner mounted upon it without any change in the propeller itself. The streamlining of the fuselage is completed by means of the usual turtle deck which is built up with mahogany three-ply formers and spruce battens.

Cockpits

The pilot seat is of wicker, comfortably placed and cushioned. Plane and engine controls are conveniently placed within easy reach. The pilot's instrument board is of duraluminum and is whirl finished. All floors are of three-ply mahogany. The pilot is extremely well protected from the air stream and the machine can be flown without goggles in comfort. The passengers' compartment is unusually roomy, being 3½ in. in width, and affording generous leg and arm room. It is completely lined in black chase leather. The dash board is of whirl finished duraluminum. The passenger's seat is of duraluminum, and is formed with a comfortable, reclining back. Thick detachable cushions are provided and a broad windshield is fitted. Access to the front seat is unobstructed by wires or struts and no high steps or excessive stooping is necessary.

The engine mounting is very accessible and adjustments can be easily made on any vital part of the engine. The radiator which is of the deep core type, is mounted upon the front cabane struts. The gasoline tank of 37 gal. capacity is mounted in the fuselage ahead of the passengers' compartment and fitted with a sight gauge.

Empennage

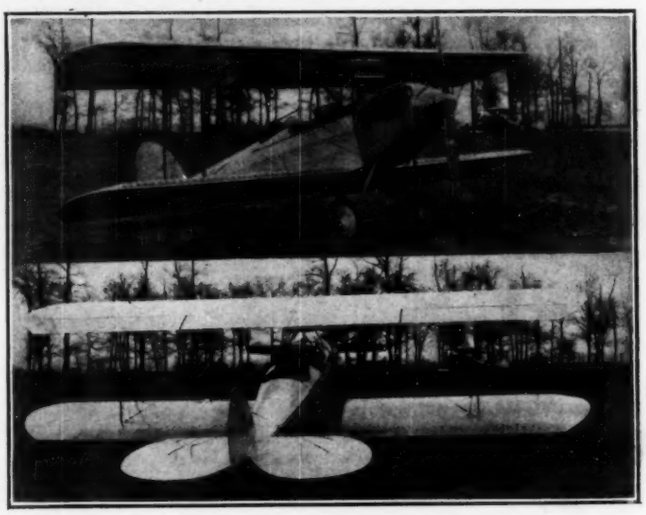
The entire empennage is constructed of steel. The stabilizer and elevators are of high aspect ratio and of a section and shape that has proven extraordinarily efficient. The stabilizer is double diamond braced with cable. The elevators are separate and are actuated by control wires of large dimension. The rudder is balanced, and of sufficient size to insure complete control when taxiing. Closed gap hinges are utilized, and the movable members are operated by streamline, pressed steel, control horns.

The landing gear is rugged and of very low resistance. It is of the Oleo, elastic cord type and has been designed to withstand the wear and abuse necessary for continual operation in rough fields. The shock absorber mounting is so arranged that over twice the ordinary movement is possible, and the dampening of landing shocks is tremendously increased. The landing gear is composed of two radius struts of streamline, steel tubing, two shock absorbing struts and the axle. All joints are made by spherical steel universal connections which prevent the bending moments being generated in the struts. Shock absorber saddles are aluminum alloy castings, so shaped that chafing is minimized. The tail skid is of novel construction, very securely mounted in a universal manner, and is the result of practical experience evolved from exhaustive tests. It is removable as a unit, and can be completely rewrapped with rubber and replaced in a few minutes.

The standard finish of the Waco is a pleasing combination of aluminum and Dutch blue. All fabric being finished with special aluminum pigmented dope and Valspar clear varnish, and all exterior metal parts such as cowls and struts being finished with Valspar Dutch blue enamel. Gray enamel is effectively used in combination with natural mahogany, whirl finished duraluminum and black upholstering inside the cockpits.

Characteristics

Length, overall	23 ft. 4 in.
Height, overall	8 ft. 10 in.
Span, upper wing	29 ft. 6 in.
Span, lower wing	29 ft. 6 in.
Chord, upper wing	5 ft. 3 in.
Chord, lower wing	5 ft. 3 in.
Gap	5 ft. 0 in.
Stagger	1 ft. 4 in.
Airfoil (wing section)	Aeromarine 2A
Angle of incidence, upper wing	2 deg.
Angle of incidence, lower wing	2 deg.
Sweepback	none
Dihedral, upper wing	none
Dihedral, lower wing	2 deg.
Angle of ship when resting on ground	17 deg.
Span, tailplane	10 ft. 0 in.
Area of wings, including ailerons	296 sq. ft.
Area of ailerons	33 sq. ft.
Area of tailplane	22 sq. ft.
Area of elevators	18 sq. ft.
Area of rudder	9.5 sq. ft.
Area of fin	2 sq. ft.
Track of wheels	5 ft. 6 in.
Weight empty, with water	1090 lb.
Useful load	800
Total weight	1890 lb.
Wing loading	6.39 lb./sq. ft.
Power loading	21.00 lb./hp.
Fuel capacity	37 gal.
Endurance at cruising speed	5 hr.
Range	400 mi.
Maximum speed, full load	92 mi./hr.
Max. speed with cross country propeller	99 mi./hr.
Landing speed, full load	32 mi./hr.
Climb	500 ft./min.



Above: A one half front view of the Model 9 Waco showing the radiator location and the landing gear construction
Below: A rear view, the layout of the control surfaces can easily be made out

Thermal Expansion of Aluminum and Various Important Aluminum Alloys

This paper by Peter Hidnert gives data on the linear thermal expansion of 4 samples of aluminum and 51 samples of important aluminum alloys. The preparation, chemical composition, heat treatment, etc. are included. Most of the specimens were examined from room temperature to about 500 deg. C. Typical expansion curves of the various groups of samples are shown and discussed.

A description of the apparatus used in this research and a review of available information obtained by previous observers on the thermal expansion of aluminum and some of its alloys, are given.

The expansion of cast aluminum (99.95 per cent) from room temperature to 610 deg. C. is represented by the following equation:

$$L_t = L_o\,[1 + (22.58t + 0.00989t^2)\,10^{-4}]$$

The relations between the chemical compositions and coefficients of expansion of aluminum-copper alloys (4 to 12 per cent copper) and aluminum-silicon alloys (4 to 12.5 per cent silicon), are shown in figures. The anomalous expansion of two aluminum-zinc alloys at constant temperature (about 270 deg. C. on heating) is shown. From the results of previous observers and the present research, it is evident that the aluminum-zinc alloy of eutectoid composition (about 79 per cent zinc) shows the greatest change in expansion at the transformation or eutectoid temperature. A triangular diagram is shown which indicates the effect of change of composition on the coefficients of expansion of aluminum-silicon-copper alloys lying near the aluminum corner of the ternary system. The table in the summary gives a comparison of the average coefficients of expansion of the various groups of samples investigated.

Scientific Papers of the Bureau of Standards, No. 497.

$7,500,177.42 Contracts with the Industry

For the first time there has become available for publication, the total business that the Army and Navy have outstanding with the aeronautical industry at a particular time. General Patrick has made these figures public in the hearings of the Select Committee inquiry into the Air Services (Part 2, pp 810-811). The table shows that on Dec. 31, 1924, there were contracts for $7,500,177.42 in process of completion with the aircraft industry for airplanes and engines. This does not include orders for airships or aeronautical accessories and supplies.

The following table shows how the contracts were allotted as of Dec. 31, 1924.

MANUFACTURER	ARMY	NAVY	TOTAL
Aeromarine Plane & Motor Corporation:			
Miscellaneous parts	$ 283.30	.....	
130 flywheel starters	.....	$99,250.00	
			$99,533.30
Atlantic Aircraft Corp:			
100 remodeled DH4's, with steel fuselage and landing gears	364,774.15	.....	364,774.15
Boeing Airplane Co.:			
45 pursuit planes, PW9 and spares (14 for Navy)	630,535.00	.....	
Miscellaneous spares	5,700.00	.....	
30 remodeled DH4's (for Navy)	96,000.00	.....	
50 NB1 planes (12½ per cent complete)	.....	500,000.00	
22 NB1 planes	.....	202,680.00	
1 Pb1 plane	.....	160,000.00	
2 OB1 planes	.....	69,000.00	
			1,663,915.00
Chance-Vought Corp.:			
20UO1 planes and spares	.....	233,398.60	233,398.60
Consolidated Aircraft Corp.:			
50 training planes, PT1, and spares	500,000.00	.....	500,000.00
Cox-Klemin Aircraft Corp.:			
2 ambulance planes, AT1, and spares (1 ready for delivery)	33,250.00		33,250.00
Curtiss Aeroplane & Motor Corp.:			
8 Model V-1400 engines	120,000.00	.....	
3 R-1454 engines	35,000.00	.....	
Miscellaneous spare parts (Engines)	6,534.00	.....	
Possible additional engines	120,000.00	.....	
Reconditioning 75 sets surfaces	.....	63,626.75	
24 pursuit planes to be let	.....	260,000.25	
			605,161.00
Douglas Co.:			
9 air transports, C1	133,560.00	.....	133,560.00
Huff-Daland Co. (Inc.);			
10 training planes, AT1, and spares (1 delivered)	101,395.18	.....	
1 light bombardment plane, XLB1	86,000.00	.....	
	187,395.18	.....	187,395.18
Loening Aeronautical Engineering Corp.:			
10 COA1 planes and spares	222,794.60	.....	
2 OL1 planes and spares	.....	58,400.00	
			281,194.73
Packard Motor Car Co.:			
8 Model 1-A, 1,500 engines	103,540.00	.....	
3 Model 1-A, 2,500 engines	66,173.60	.....	
Miscellaneous spare parts	4,913.47	.....	
10 1-A, 1,500 engines; 5 1-A, 2,500 engines	.....	260,923.69	
			435,550.76
Steel Products Engineering Corp.:			
500 remodeled Liberty engines (40 per cent complete)	179,893.15	.....	179,893.15
Thos. Morse Aircraft Corp.:			
Miscellaneous spare parts	7,149.30	.....	7,149.30
Wright Aeronautical Corp.:			
Miscellaneous engine spare parts	15,299.90	.....	
154 J-4 engines and spares	.....	1,080,200.00	
Conversion of 1F2W seaplane	.....	24,800.00	
		1,105,000.00	1,120,299.90
Total	$2,712,795.65	$4,787,381.77	$7,500,177.42

Stability and Controllability of Airplanes

Part VII. Actual Airplanes and the Tail Spin

By B. V. KORVIN-KROUKOVSKY

We have shown how the stability in yaw and in roll can be secured separately, what is the immediate effect of the rudder and aileron controls, and how the relative proportion of stability in roll and in yaw affects the flight of uncontrollable models. Now we will endeavor to show how these characteristics affect the flight of actual airplanes, and particularly how they affect the response of an airplane to controls, as the flight of an uncontrolled airplane is similar to the flight of models. We do not need to dwell here upon the cases of actual instability in either roll or yaw, as these cases are rare, and when they do occur they are self evident and must be corrected before we can discuss the effect of controls. We will concentrate our attention now on three combinations of lateral stability often met in existing airplanes and explaining the different nature of their lateral controls. These cases are: a) Stable in yaw and neutral in roll, b) Neutral in yaw and stable in roll and c) Stable both in yaw and in roll.

Spiral Instability

The airplane stable in yaw and neutral, or nearly neutral in roll, is characterized by tendency to develop *spiral instability*, which is the more pronounced the higher the stability in yaw. This case is essentially similar to the case of the model B shown in Fig. 15. Such an airplane if left uncontrolled in calm weather may be observed to start the turn and to tighten it gradually if left alone for a sufficient time. In bumpy weather, an airplane may be placed by a gust of wind in a position favorable for starting a turn (bank and side slip), and will show its instability so much the quicker. In the case of such an airplane the rudder will control the yaw, but will influence the roll comparatively little. The rudder may still be used for control of the roll at lower air speeds, but its movements then must be very brisk, as only *first effect*, that of angular velocity of yaw must be depended on. The fact of the airplane being yawed will not cause it to roll, and therefore there will be practically no *second effect*. A satisfactory turn cannot be made, therefore, by the rudder alone, and it is not even advisable to start it with the rudder. The action of the rudder merely results in skidding but does not produce a good turn, as the airplane has no tendency to roll in response to skidding. On the other hand the action of the ailerons causes roll, and the stability in yaw will make the airplane yaw in response to even a very slight side slip barely noticeable to the pilot. Perfect turns can thus be started and accomplished by the ailerons alone, the rudder barely being moved from its neutral position. During the turn, the outer wing moving faster than the inner one has more lift and gives the airplane a tendency to overbank. This tendency can be resisted only by the action of the ailerons, and requires holding the stick in the direction opposite to the turn. *Steering by the ailerons practically without use of the rudder and a tendency to overbank are the most conspicuous characteristics of an airplane inclined to be spirally unstable.*

All the control in roll in the case of such an airplane is obtained by the *lifting action of the ailerons*, and their *drag action* is not important because the yaw has very little to do here with the roll. The use of ailerons with heavy wash-out or differential action is liable to do in this case more harm than good, as the airplane already has a tendency to overyawing and skidding. As the ailerons must roll the airplane and overcome its inertia and damping without any assistance from the rudder, they are liable to prove stiff and ineffective. Extreme care should be exercised, therefore, in proportioning the ailerons so as to get the best possible lifting efficiency. Long, narrow ailerons on all four panels of a biplane usually are needed.

As the basic cause of spiral instability lays in the lack of stability in roll, the evident remedy is to increase it by increasing the dihedral or by the addition of non-skid planes. In most of the airplanes a degree or two of dihedral can be added in rigging without any structural changes, and this may make a vast difference in the behavior of the airplane. The ability to keep the direction of flight with hands off will be improved, the rudder will become more effective as a means for steering, and the ailerons will usually be found to be more sensitive because of being assisted by the rudder.

It is difficult to find enough information on actual airplanes which display all of the characteristics described above in a sufficiently marked degree. As the nearest and best known example we can mention the Curtiss JN4. Flying tests made by the staff of the National Advisory Committee for Aeronautics and described in Rep. No. 112 showed that at a speed of 70 mi./hr. it takes about 10 deg. of rudder and from 0 to 2 deg. of aileron movement to keep the airplane flying at 10 deg. yaw. This shows that the airplane is quite stable in yaw, while almost indifferent in roll. The airplane steers almost entirely by the ailerons and very little rudder is used. Originally it was fitted with ailerons on the upper wing only, but it was found desirable to equip all Army training airplanes with ailerons on all four panels.

Let us consider now the airplane *very stable in roll and almost neutral in yaw*. This machine is much more likely to keep its direction of flight with hands off than the previous one. A gust of wind may cause the airplane to bank. It will right itself without the pilot's intervention after a short side slip. The direction of flight will not be changed appreciably during the side slip, because there is no tendency to yaw in response to it. For the same reasons the side gusts are not likely to affect the direction, as side gusts are virtually equivalent to side slipping or skidding. Given a sufficient amount of damping in yaw, such an airplane probably would be classified by pilots as stable directionally.

The turns in this case can be started and accomplished readily by the rudder alone. The action of the rudder causes a yaw in response to which the airplane stable in roll will bank. During the turn the tendency to overbank due to the higher velocity of the outer wing will be present, but will be corrected automatically by slight side slipping, and will not require intervention of the controls. As far as the feeling of the pilot goes, the airplane will have no tendency to overbank. *Ability to be steered by the rudder alone and lack of noticeable tendency to overbank are characteristic for this type of airplane.*

Yaw

As the rudder can be successfully used for control of the roll, both by its *first* and *second effects*, the ailerons are not very important and even mediocre efficiency can be tolerated. As the roll in the case of such an airplane reacts readily to yaw, the drag effect of ailerons must be particularly considered in their design. Ordinary ailerons are liable to prove inefficient, as the drag of the lowered aileron will readily yaw the airplane in the wrong direction, and both effects of yaw on roll will detract from the lifting action of the ailerons. Ailerons with wash-out or differential action on the other hand will be much more efficient, as they will tend to yaw the airplane in the direction of the raised aileron, with the result that both the *first* and *second* effects of yaw will act *with* the lift effect of ailerons. Such ailerons by providing proper amount of yawing simultaneously with roll can be used for steering the airplane, which in this case *can be steered by either ailerons or rudder, or by any combination of the two.*

Washed-out or differential ailerons fitted to an airplane stable in roll derive their efficiency from three simultaneous causes—lift and first and second yaw effects—and therefore

need not be large. Many German airplanes with noticeable dihedral obtain quite satisfactory controllability with washed-out ailerons as small as 7 per cent of the wing area and fitted to the upper wing only.

The combination of high stability in roll and little stability in yaw is very favorable for the maneuverability of an airplane. The machine can be readily yawed by either rudder or differential acting ailerons or both, and yaw will provoke rolling moments *comparable in magnitude to the damping in roll.* In this case the rudder and ailerons play the part of the valve of a steam hammer, the wings—the part of the piston, and the relative wind—that of the steam, always ready to do the work for the pilot. As a concrete example we will mention the SE5 scout, which has an abnormal dihedral of 4.5 deg., yet is noted for its maneuverability.

Excess Stability

An airplane *very stable both in roll and in yaw* will behave very well in calm weather with hands off, but is likely to prove the most bumpy of the three combinations in rough weather. Each gust of side wind will not only roll, but yaw the airplane as well. As the gust passes and the banked airplane begins to side slip in order to right itself in roll, it also begins to yaw in the direction of the side slip. This repeated yawing is liable to change the direction of the flight path, and although the pilot can safely leave the machine to roll about, he will have to attend to the resumption of the correct direction of flight after each bump.

The airplane can be steered by either ailerons or rudder, but neither is likely to prove very effective because of the stability and damping to be overcome both in roll and in yaw. Joint action of both controls will therefore be necessary, although exact coordination is not very important. The airplane has a tendency to be rather easy to fly, but not very maneuverable. To insure reasonable maneuverability, all control surfaces must be designed for the utmost power and efficiency both from lift and drag points of view. Use of long and narrow ailerons on all four panels with differential control and washed-out tips can be recommended.

In case the lack of maneuverability of such an airplane proves to be objectionable, it is not safe to reduce the stability in roll without changing the stabilty in yaw, as the excess of latter may lead to *spiral instability.* The best step to take is to reduce the stability in yaw by reducing the vertical empennage area, or by providing some equivalent to vertical fin area in front of the center of gravity to counterbalance the excessive empennage effect. If this is derived from a long and deep fuselage it is difficult to modify.

Tail Spin

A considerable amount of study was given to the question of tail spin in England in the years 1917 to 1920 and thorough information about it appeared in A.C.A. Rep. & Memo. Nos. 411, 549 and 618. In short the conclusions were reached as follows: the basic characteristic of the tail spin is *autorotation* which takes place *after the airplane is stalled,* i.e. after its angle of incidence is much larger than that of maximum lift. The spin itself is merely a very tight spiral with large angle of incidence on the wings. As this angle is above stalling angle, the drag is very large, and the greater part of the weight of the airplane is supported by it, while the lift is used to turn the airplane on its path. The observations made in spinning actual airplanes show that the average angle of incidence of the wings is about 30 deg., and is much larger on the inner wing than on the outer one. The air speed is correspondingly low, and is only little higher than the stalling speed. The angle of bank is around 80 deg., and the load factor on wings due to the centrifugal force is from 1.6 to 2.7. The time required for each turn varies from 2½ to 7½ sec. depending on the airplane. Both wind tunnel tests on the autorotation of airfoils and flight tests of actual airplanes show this time to be directly proportional to the span of the wings, and inversely proportional to the air speed. Thus the Bristol fighter equipped with experimental wings of aspect ratio of 6¾ and 9, spun at the rate of 2.4 and 3.6 sec. per turn respectively. Heavy wing loading was found to increase the rapidity of the spin, because of higher air speed. Indeed, very lightly loaded Farman airplanes of 1914-15 spun so slowly and gently that observing from the ground it was difficult to distinguish a tail spin from a tight spiral.

Military Value

The tail spin as a maneuver is useful in fighting, and all army or navy airplanes of fighting class must be capable of being spun readily. On the other hand even these airplanes must not show a tendency to spin at any accidental stall due to the error of the pilot. Heavy bombardment airplanes, and commercial airplanes of all sizes and classes do not include the spin in the number of useful maneuvers and must be made as spinproof as possible, as this will greatly reduce the number of accidents due to mishandling of airplanes at low altitude. We will endeavor to consider therefore how the different properties of the airplane will affect its spinning characteristics.

As the basic cause of the tail spin is stall, the longitudinal stability is of considerable importance in this connection. Airplanes unstable longitudinally, i.e. having the center of gravity too far back on the mean chord, stall readily and were observed to spin more rapidly and with less elevator control than stable ones. The more stable longitudinally is the airplane, the more difficult it is to stall it, and consequently it will have less tendency to spin.

We mentioned that the tail spin is merely a tight spiral with a very large angle of incidence, and therefore as in any spiral there is very little, if any, side slipping or skidding. This being the case *the stability in roll has no bearing on the spinning qualities of the airplane.* Indeed, the SE5 scout with its abnormal dihedral of 4½ deg. can be spun readily. During the spin the ailerons are not very important. Ailerons displaced in the direction of spin are known to increase its rapidity and to make it smoother, while ailerons displaced in the opposite way result in a somewhat slower and more jerky motion. But the ailerons are never powerful enough either to stop the spin, nor to maintain it against the action of other controls.

Prevention

The damping and stability in yaw are probably the most effective means of preventing a tail spin from taking place. We said that in tail spin there is practically no skidding or side slipping. This is quite true with respect to the wings located near the center of gravity, but is not true in regard to tail surfaces. The radius of turn is so small (1½ to 3 times the span of the airplane) and the angular velocity is so large that the empennage will receive a side wind even if the center line of the airplane is tangent to its spiral path at the center of gravity. This will apply also to the vertical fin area of any description located sufficiently far in front of the center of gravity, such as sides of long fuselages found in twin engined cabin airplanes and in flying boats. Considering the high value of angular velocity in spin this damping in yaw is very strong and effectively opposes the rotational movement of the airplane. It is a matter of practical observation that some airplanes will not spin with large vertical fins, and will do so readily upon removal of these fins.

The rudder retains its controlling value after stall, as we explained in consideration of elements of control action, and therefore is of utmost importance in the tail spin. Quick movement of the rudder in the direction opposite to that of spin will make the airplane yaw in that direction, with the result that lower wing gains in lift, while upper, or outer one loses (*first* effect of yaw). This action is often sufficient to stop the tail spin, or to reverse its direction. Very powerful rudder may enable the pilot to fly the airplane at an angle of incidence considerably above stalling, counteracting the tendency for autorotation with brisk movements of the rudder. In a similar way a very powerful rudder may make the airplane spin, although it may be not at all inclined to spin of its own accord.

(To be continued)

Housing the Air Mail

New Hangars Provide Modern Facilities for Air Transport

An aviation station built as part of an operating air transport system is an entirely different, (and more difficult), proposition from the ordinary flying field. The latter will function well enough under almost any makeshift and unstudied layout plan. An institution like the Air Mail, however, has very definite and exacting necessities. These exist in regard to the arrangement of buildings and of the rooms within them, and the sizes, the lighting, power outlets, heating and ventilating of these rooms, the operation of doors, the clear spans and heights, water and fuel supply and storage, controls of the lighting, the emergency heating, and the type of roofing, of masonry, of framing and of floors, equipment of shop, of hangar proper, of motor room and store room and office arrangements. There are also the usual garage, transformer house, runway and field lighting requirements.

The Air Mail Service has probably the only lengthy experience with these problems in the United States. John E. Whitbeck, general superintendent of the Eastern Division, has studied the exact needs of his stations. He knew from long practical and scentific observation, just what was wanted at each station to insure the most efficient operation of the whole system. The engineering features were worked out from his specifications and the stations are now under construction by the Spalding Construction Co. of New York City, engineers and contractors. They built the first unit of the new Eastern Terminal at Hadley Field, N. J., near New Brunswick, last November. It has proven to be an unqualified success and has well demonstrated the efficiency of the station plans evolved by the Air Mail officials. It is of interest to note that, in line wtih the Air Mail's tradition for speed and efficiency in whatever it undertakes, this building of concrete and steel with 65 ft. wooden truss roof framing was erected ready for use within thirteen working days after the contractor received the order.

Rapid Construction

On March 30 the order was placed for one complete unit at the new field at Bellefonte, Penn., and this was completed by the same engineering firm, ready for occupancy on April 18. They are now building the large Air Mail station at the new Cleveland municipal airport. This consists of three hangars, a transformer house and an office building for the headquarters of the Eastern Division. One hangar will be for West bound traffic, one for East bound and the third for spare and storage purposes. They will be heated by a central vacuum steam-heating plant. A concrete court, 75 ft. wide by 175 ft. long connects the three. The Spalding Construction Co. also has the contract for an additional hangar at the Hadley Field Terminal in New Jersey.

These buildings consist of a hangar proper, 100 ft. long and 65 ft. wide with a clear height of 14 ft. At Hadley Field, the two hangars have doors at both ends which open for the full width. At Bellefonte, which is more a fueling station, there are doors only at one end of the hangar. The three Cleveland hangars are 20 ft. shorter and face each other around a court with doors opening only on the court. Steel rolling doors are being used throughout the new buildings. They are made in three sections and the center guide posts are raised as well as the doors by a mechanism operated from one point on the inside wall of the room. One side of the hangar room has a lean-to 20 ft. wide running the full length. This space is divided into store rooms, garage space, pilots' rooms, office, etc. All the floors except in the offices, are of 1-2-4 concrete placed over a packed cinder fill. The walls of the Bellefonte hangar and transformer house are made of brick. All the other buildings have walls of 8 in. hollow concrete blocks.

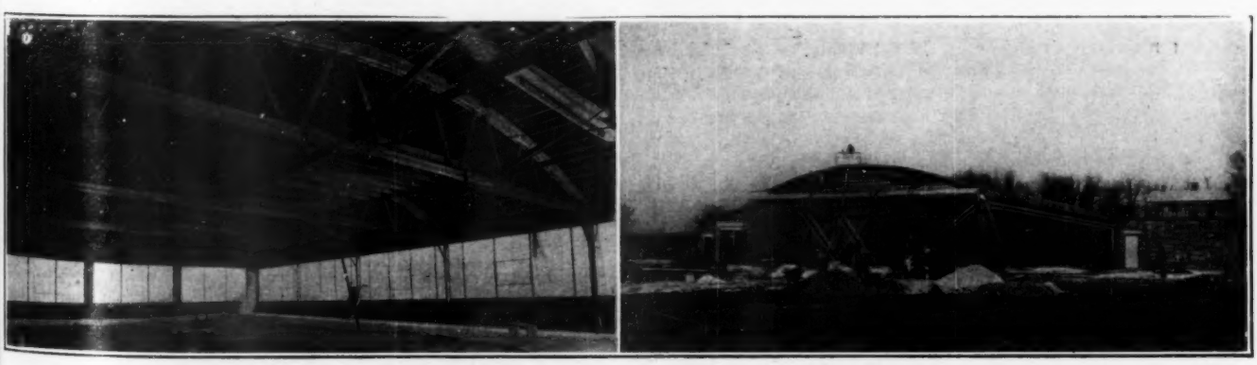
Rigidity

The outside walls of each building are practically filled with steel sash to afford the greatest possible lighting and ventilation. The 65 ft. bos-string wooden trusses which span the hangar space are supported on steel columns. These columns are sunk into concrete foundations and are stiffened laterally with heavy steel lintels. The trusses are well tied to the columns and are braced with steel knee braces. This rigid construction has been well justified by the behavior of two of the buildings in very heavy wind storms which occurred before the doors were in place.

The strength of the hangars is of extreme importance as the Air Mail has lost considerable equipment in the past through the collapse of their old buildings during wind storms.

The new hangars are only partly fireproof, as the roof and trusses are made of wood. However, the planes stored are so inflammable that the contents of even a completely fireproof building would be destroyed in case of a fire. To lessen this danger the floor slants downward to the door and the planes which are at all times kept on dollies can be wheeled out by a single man.

The lighting has been subject to considerable study because these buildings must be used by night as well as by day. The heating is a separate problem in each case. In certain buildings, direct fired oil burning heaters with blowers are used and in the Cleveland group a vacuum steam-heating plant is being installed with a heating unit and blower in the hangar rooms. The principal problem in connection with heating is to provide a means of rapidly raising the temperature in the hangar after the doors have been opened in winter so that very little time need be lost by mechanics working in the room. This has been gone into very thoroughly and is an engineering problem in itself.



The new hangar at Bellefonte on the seventeenth day of construction

The National Elimination Balloon Race

The 1925 Race Won by the Winner of the 1924 Race

The Litchfield Trophy and the right to represent the United States in the Second Gordon Bennett Cup Race at Brussels was won by Wade T. VanOrman, the winner of last year's races, in the balloon Goodyear III. The race started from St. Joseph, Mo., May 1. The bags were inflated with sixty per cent water gas and forty per cent hydrogen. Carl F. Wolfley was in charge of the race with A. B. Lambert as referee.

The start of the race was delayed by a strong wind from the Northwest that hampered inflation early in the afternoon, and the gas was turned off for more than one hour. Pilots said damage might be done to the big bags if inflated in the heavy wind. They swayed back and forth, sometimes nearly touching the ground.

The Litchfield Trophy

It was not until 5:47 p. m. that the pilot balloon, in charge of Maj. Maurice Smith of Kansas City, took off to lead the way for the contestants. He had been scheduled to depart at 5:10 p. m.

Major Smith was refused permission to compete in the race with the other balloons by Maj. A. B. Lambert of St. Louis, the referee. Major Lambert said he acted on the advice of Maj. General Patrick, Chief of the Army Air Service, who was there to see the start of the race.

The pilot balloon is less than half as large as the other balloons and was filled entirely with hydrogen gas. The contention was that it would not be fair competition since the larger balloons were filled with 60 per cent of water gas, which does not have the lifting power of the hydrogen.

The first of the contesting balloons, the Army S14, piloted by Lieut. William J. Flood, took off at 5:59 p. m. and sailed away to the southeast before a stiff breeze. Lieut. Haynie McCormack was Lieutenant Flood's aide.

The Goodyear III, flown by W. T. Van Orman, with C. K. Wollam as aide, got away ten minutes later.

Capt. H. E. Honeywell, veteran aeronaut, soared away in the St. Joseph at 6:42 p. m. His aide was Harry Preston.

Tribute was paid by officials of the race to the nerve of W. C. Naylor, aide to Herbert V. Thaden, who was overcome by gas not long before his balloon, the Detroit, was to start. He was revived by the pulmotor and insisted on accompanying Thaden against the advice of physicians. The aide was lifted from an ambulance and placed in the basket just before Thaden took off at 6:58. Physicians advised that the trip might result in pneumonia, since Naylor's lungs were weakened by the gas.

A sixth pilot, Capt. Raymond E. O'Neil, saw his hopes blasted early in the afternoon when the net about his balloon, the S16 of the Army, was torn. The big bag was then ripped open and deflated. It was Captain O'Neil's first chance to take part in a national balloon race.

The following tabulation gives the official positions and distances.

Position	*Pilot*	*Landing Place*	*State*	*County*	*Distance*
1.	W. G. Van Orman	Reform	Ala.	Pickens	585 mi.
2.	Lt. Wm. J. Flood	18 mi. south Batesville	Ark.	Independence	342 "
3.	H. E. Honeywell (Demoted to third position)	1 mi. west of Aberdeen	Miss.	Monroe	543 "
4.	Herbert Von Thaden (Demoted to fifth position)				
5.	Herbert Von Thaden	3 mi. NE Selma	Kans.	Anderson	110 "
	Maj. Maurice Smith Non-contestant Pilot Balloon	Crenshaw	Miss.	Panola	450 "

In view of the bad weather conditions, H. E. Honeywell and Herbert Von Thaden objected to inflating their balloons during the official inflation period. The pilots were repeatedly warned by Maj. A. B. Lambert, the official referee appointed by the Contest Committee of the National Aeronautic Association, that they were subject to disqualification. It was finally decided, after Major Lambert had been in conference with the St. Joseph Contest Committee, Sunday night, May 2, to demote H. E. Honeywell and Herbert Von Thaden one position with the result that although Honeywell made greater distance than Lt. William Flood, he will be placed in third position, moving Lieutenant Flood up to second position and placing Herbert Von Thaden in fifth place.

Arrangements are now being made for the three winners, Van Orman, Flood and Honeywell to go to Brussels, Belgium, at once as America's team in the first contest for the Second Gordon Bennett Cup. This contest will be held at Brussels, Belgium on June 7. It is rumored that Capt. R. E. O'Neil will be sent over by the Air Service as an alternate pilot.

Naval Architect Believes in Airships

The designer of the Leviathan and the Majestic, the two biggest ships afloat, Dr. Foerster, believes that the day of the great ocean liners has passed with the development of airship service that is to revolutionize ocean passenger service.

With the tremendous demand for air service, Dr. Foerster predicts that the building of swift passenger vessels anywhere near the size of the Leviathan will be discontinued. The steamships of the future, he believes, will be combination passenger-cargo vessels not exceeding 30,000 tons displacement and 22 knots speed. With airships making the trans-Atlantic flight in 65 to 70 hr., he said it would be an economic loss to try to compete by means of steamships.

Photo International

The principals in the Balloon Race. Left to right: C. L. Cabot, W. T. Van Orman, Gen. Mason Patrick, Maj. H. Smith, H. Von Thaden, Lieut. W. J. Flood and H. E. Honeywell

A Proposed American Air Line

We are indebted to Horatio Barber of The Aviation Syndicate, for a most interesting study on the establishment of an air line between New York and western points. Mr. Barber was one of the pioneers of aviation in Great Britain, having designed, built and flown 28 airplanes in the years 1908 to 1912. From 1912 to the beginning of the war he was interested in the business side of flying and helped organize the Aireo. During the war he was a noted instructor and author of aeronautical text books. Much of the work in compiling the figures was done by Archibald Black, well known as a consulting aeronautical engineer. The Air Mail figures were carefully studied as were the statistics of the European air lines. More than a year was spent in compiling and properly analysing them and the report contains much valuable material for any one wishing to start an air line on a large scale.

The line planned was from New York to Chicago, with branches running from there to Kansas City and St. Paul. By the use of night flying it was planned to save a business day on delivery of mail to Chicago, and two days on the Western points.

Quite rightly the question of possible revenue was taken up first. An agent was sent out to a large number of banks in the western cities to obtain an expression of opinion from them as to the amount of business *they* could supply if the planes could save them a day on the forwarding of the checks. Accurate figures are available on the amount of checks which are exchanged between the various cities. Figuring on a very conservative basis it is estimated that a revenue of $4,000 a day could be derived for the air line on charges so low that the banks would make a real saving.

The next source of revenue was Airgrams or very long "night letters" which would be delivered by plane instead of by wire, and which would be handled at the terminal through Western Union. The revenue to be derived from this was figured at $920 per day.

The third source of revenue was from such goods as newspapers, merchants samples, films, jewelry, machinery parts, etc. After careful consultation with the American Express Co., it was thought that 500 lb. of such load could be obtained each way at a rate of ¼ cents per pound per flying mile thus giving a revenue of $3,000.00 per day. It is to be noted that no attempt would be made to carry passengers, at least not during the first period of operations. Once the line has been proved out it is hoped that this end of the business could be developed and that there will also be considerable additional miscellaneous revenue.

The total daily revenue would therefore be.

From banks	$4,000.00
From airgrams	920.00
From express matter	3,000.00
Total daily revenue	7,920.00
Yearly revenue	$1,995,840.00

A most careful analysis was made of the capital costs required. These include very detailed costs of laying out and draining fields, building hangars and renting or buying emergency landing fields. There is much information on the cost of radio, night flying equipment, etc. We regret that space does not permit us to give these details.

Until a large number of planes could be put into daily operation, the plan provides for the renting of landing fields. There is provided for:

Total, grounds, buildings etc.		$259,441.00
Levelling, draining of fields and runways	$ 22,050.00	
Hangars, shops, offices, etc.	109,567.00	
Miscellaneous	10,544.00	
Engineering, surveys, etc.	47,280.00	
Organization expenses	70,000.00	
Total movable equipment		$1,077,639.00
Airplanes	390,000.00	
" spare parts	16,645.00	
Engines	340,000.00	
Spare parts and supplies	$26,426.00	
Airplane equipment including radio	31,200.00	
Motor transport	20,008.00	
Office equipment	16,286.00	
Shop equipment	8,230.00	
Beacons, landing lights etc.	172,500.00	
Radio stations	38,780.00	
Misc., field equipment	17,564.00	
Total operating cost for one year		1,395,480.00
Rent of fields, offices, etc.	52,120.00	
Gasoline, oil, grease	143,100.00	
Raw materials and parts used	75,047.00	
Replacements	226,340.00	
Washouts, airplanes, engines, etc.	122,900.00	
Engine replacements normal	103,440.00	
Motor transport, office supplies, etc.	62,388.00	
Depreciation, airplanes & equipment	85,050.00	
Depreciation buildings, shop equipment, etc.	30,481.00	
Plant maintenance	23,056.00	
Maintenance beacons and landing lights	32,215.00	
Payroll, pilots and field helpers	163,400.00	
Maintenance of planes	55,300.00	
Manager and office salaries	148,400.00	
Business extension	113,287.00	
Insurance	42,004.00	
Taxes	34,781.00	
Miscellaneous	108,511.00	
Total capital required		2,732,560.00

Summarizing the amount of capital required would be as follows:

Grounds and buildings	$259,441.00
Movable equipment	1,077,639.00
Operating cost for one year	1,395,480.00
Total capital required	$2,732,560.00

The expenditures are given in much greater detail than the above, and to save place we have been forced to group certain of them together. An explanatory note is made for each item, showing how the figures were derived.

The schedule calls for 3,560 mi. of flying per day or 897,000 mi. for a year of 252 flying days. There would be 26 planes, 34 engines, and 16 pilots and alternate pilots. The planes would thus fly 34,500 mi. per year and the pilots 56,060 mi. The life of the engines is estimated at 800 flying hours, and that of the planes as four years of elapsed time. The cost of the flying mile is figured as $1.65, with a possible useful load of 1,800 lb.

The decrease of the cost, if more planes were operated over the lines, is clearly shown in the tables. No estimates however are made for lower costs with more intensive utilization. The number of forced landings to be expected and the maintenance figures are taken from a careful study of the Air Mail.

AVIATION would like to give its readers some figures on an air line which had actually been in operation. Unfortunately, the figures on the European air lines are not disclosed to the public. The Air Mail figures, on the other hand, due to the use of war surplus planes and of government facilities do not furnish an adequate picture. Other lines in the United States have not been run either on a large enough scale or for a long enough consecutive time to afford comprehensive figures. Any costs must therefore be somewhat theoretical and based on an intelligent presentation of the figures available. Mr. Black has made a very careful study of the available material and his figures should be a valuable indication of the cost of commercial flying. If any of our readers desire further details on this subject they should apply to Horatio Barber, 30 East 42 St., New York City.

A Modern Interior

The interior of the new Junkers G23 three-engined transport

The Wright-Langley Controversy

Both Sides Presented by Orville Wright and Dr. Walcott

AVIATION *gives below both sides of the dispute over the priority of The Wrights or Dr. Langley. First Orville Wright states his version and Dr. Walcott replies.*

Several days ago I was asked by a New York newspaper, Orville Wright is reported to have said, whether the rumor was true that our first plane, of 1903, was about to go to a museum in England.

I stated at that time that I was sending the machine to the Science Museum at South Kensington, London, because I did not dare to intrust it to the only suitable national museum in America in view of the fact that that institution has allowed the historic relics of the Langley machine of 1903 to go out of the institution into the hands of private parties to be mutilated for private purposes; that the machine now hanging in the institution is, much of it, new material and some of it of different construction from the original, and that the card attached to the machine is not true of the original machine or of the restored one.

Dr. Walcott, Secretary of the Smithsonian Institution, has made a reply to my statement which does not clearly deny any of my assertions. In order to give the public a clear understanding of the issues I will make the following positive statements:

Patent Decision

On the 13th of January, 1914, the United States Circuit Court of Appeals for the 2d District handed down a decision in which it was held that the machines being built by the Curtiss Company were infringements of the Wright patents and that "the patentees may fairly be considered pioneers in the practical art of flying with heavier-than-air machines and that the claims should have a liberal interpretation."

The Curtiss Company was enjoined from building airplanes such as it had been building. The company then modified its machine and, in anticipation of another suit on claims of the patent not involved in the first, began preparations for a new defense. Now began an active campaign to establish some one else as the pioneer.

Langley was chosen.

On Jan. 26, 1914, less than two weeks after the decision of the Court of Appeals, it was reported in the press that Lincoln Beachy, a stockholder of the Curtiss Company, asked Dr. Walcott's permission to try to fly the original Langley machine, saying: "You can fly a kitchen table if your engine is strong enough."

Dr. Walcott at that time replied "that it would be inadvisable to take out the wrecked machine from its place in the museum." (See daily papers Jan. 26, 1914.) However, Dr. Walcott soon changed his mind, for in the annual report of the Smithsonian Institution of 1924, page 218, this statement appears:

"When in March, 1914, Mr. Glenn H. Curtiss was invited to send a flying boat to Washington to participate in celebrating Langley Day he replied he 'would like to put the Langley plane itself in the air.' Learning of this remark Secretary Walcott of the Smithsonian Institution soon authorized Mr. Curtiss to recanvas the orignal Langley airplane and to launch it either under its own propulsive power or with a more recent engine and propeller."

These were the circumstances under which Dr. Walcott through "sheer interest in aviation" allowed this historic relic to be taken out of the institution.

Now for the manner in which the tests of the airplane were made; Mr. A. F. Zahm, was appointed by Dr. Walcott as the 'official observer' of the Smithsonian Institution in these tests. "Not one penny," Dr. Walcott told me, was paid by the Smithsonian for Mr. Zahm's services in this capacity.

In fact, he told me that the institution did not pay any of the expenses of the test except some transportation charges. I have proof that the following changes were incorporated into the airplane in the trials which Dr. Walcott says he witnessed.

The wings had a different camber, different aspect ratio and different area. (Every aeronautical engineer knows that these are the features which determine the dynamic efficiency of the wings.)

The wings also were of different mechanical construction.

The trussing used by Langley was modified, strengthened and was moved thirty inches backward nearer the center of pressure. (The misplacing of the trussing was the primary cause of the wrecks of the airplane in 1903.)

A new system of control was adopted.

The Penaud tail, fixed, on the Langley machine was made movable.

The fixed vertical keel used in 1903 was entirely omitted.

The rudder designed by Langley in 1903 for steering was enlarged and used for maintaining lateral balance.

An entirely new system of launching was used.

The forward corners of the original propellers were cut off after the manner of the early Wright propellers.

The radiator employed by Langley was changed to a radiator of modern type.

The Langley engine was changed by the installation of a new carburetor, new intake manifold and a magneto.

Many other changes of minor importance were made.

And yet in Dr. Walcott's report of the United States National Museum for that year, 1914, appears the statement that the Langley machine was flown "in June last, without modification."

As to the card now hanging on the machine in the museum. This card reads:

"Original Langley flying machine, 1903, the first man-carrying airplane in the history of the world capable of sustained free flight. Invented, built and tested over the Potomac River by Samuel Pierpont Langley in 1903. Successfully flown at Hammondsport, N. Y., June 2, 1914."

The machine as it hangs in the museum today has the appearance of the Langley machine of 1903, but much of the original material, which was mutilated or destroyed at Hammondsport in 1914, has been replaced with new material; and some of these parts are of different mechanical construction. The airplane tested at Hammondsport was not like the original or like the machine hanging in the museum.

It certainly was not the airplane "invented, built and tested over the Potomac River by Samuel Pierpont Langley in 1903." The machine now hanging in the museum (or one like it) was not tried at Hammondsport in 1914. No attempt since 1903 has ever been made to fly the airplane (or one like it) "invented, built and tested over the Potomac River by Samuel Pierpont Langley in 1903."

Statement on Card

The statement, then, on the card in the museum that this is, "The first man-carrying airplane in the history of the world capable of sustained free flight" must be merely an expression of Dr. Walcott's opinion, since it is not based on any actual tests. Dr. Walcott is reported to have said that I do not like the statement on the card. It is not important whether I do or do not like this statement, but it is important whether this statement on the card is true.

Dr. Langley is not responsible for any of the circumstances which led me to refuse to let our machine go into the Smithsonian Institution. Our machine is now wholly in its original form and almost wholly of its original material.

I would not wish to leave to the discretion of the management of any museum the right to make any change in the design of it for any purpose whatever. If one-half of the changes made in the Langley machine were to be made on our machine it could easily be proved not "capable of sustained free flight."

No one could possibly regret more than I do that our machine must go into a foreign museum. It is not safe where it is. It suffered in one flood and has always been liable to fire. Excepting the National Museum or the Smithsonian, I know of none in this country so suitable for such an exhibit as the Science Museum at South Kensington, London.

Dr. Walcott's Version

I do not know that the American public is interested in the details of opinion of Mr. Wright and myself in relation to the trials of the Langley airplane, but I feel assured that it is deeply interested in any attempt to remove from America, the home of the successful airplane, the original machine that first carried a man in flight.

The Langley machine, after its crash in the Potomac River in 1903, was returned to the Smithsonian shops, where it was cleaned, the wings being stored in their mutilated condition, together with the frame and engine, in the carpenter shop....

After the final tests in 1903 the War Department turned the Langley plane over to the Smithsonian. As stated on page 279, 'Langley memoir on mechanical flight,' it was left in Dr. Langley's possession and available for any future tests that he (Langley) might be able to carry on in connection with the problem of mechanical flight.

Dr. Langley, discouraged and without funds, and his health failing, left the airplane untouched, and it remained in the shops in its dismantled condition until 1914.....

It seemed worth while to give it another tryout, and especially on account of the desirability of testing the tandem wing principle, which was then thought valuable for large aircraft. I talked the matter over with Dr. Albert F. Zahm, who was then not in the employ of the Curtiss Aeroplane Company, but who held the honorary position of recorder of the Langley Aerodynamical Laboratories, which was the forerunner of the present National Advisory Committee for Aeronautics, of which I have been a member since its organization and chairman since 1919.

Dr. Zahm agreeing, I then talked with Dr. Alexander Graham Bell, who was most enthusiastic, and said that the Langley airplane should certainly be given tests, if it was possible to do so. I asked Glenn Curtiss if he would not undertake the tests and submit an estimate of the approximate cost of restoring and testing the machine over the waters of Lake Keuka. The estimate was submitted, approved and the airplane was taken out of the Smithsonian shops and shipped to Hammondsport in April, 1914. It was not an historical relic belonging to the National Museum, but an airplane left with the Smithsonian Institution by the War Department for experimental purposes.....

Mr. Wright is mistaken with reference to my having told that the institution bore no expense of these tests except the transportation charges on the machine to Hammondsport. Not only were these transportation charges paid, but Mr. Curtiss was paid $2,000 for making the tests.

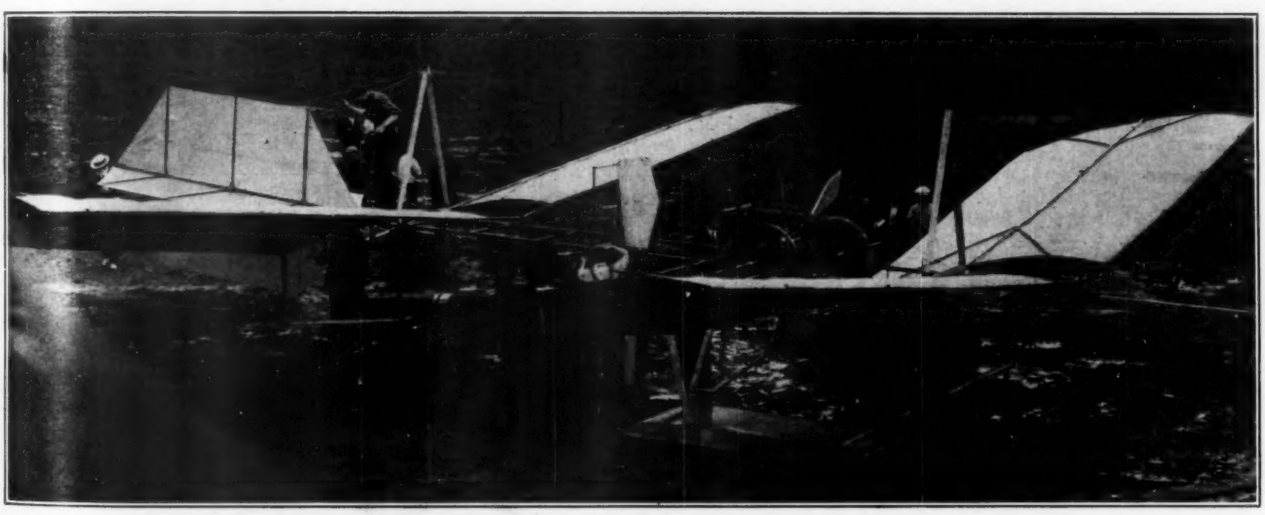
"May 21, 1914, I went to Hammondsport to see the tests and the following day the machine was taken to the aviation field on Lake Keuka and assembled with the floats and their framework that attached the floats to the main frame of the machine, which added over 300 lb. dead weight. I examined the machine carefully and found it with the orignal engine and driving mechanism, driver's seat, main frame and double tail, and wings inferior in workmanship but of Langley design.

At the test on May 28, 1914, I went out in a boat on Lake Keuka and saw the Langley airplane as just described rise from the water and make short flights with Mr. Curtiss in the cockpit or pilot's seat, as originally provided for by Dr. Langley. Being fully satisfied that the machine was capable of flight, I requested Mr. Curtiss to install a more recent engine and propeller to determine more fully the advantages of the tandem type of airplane.

After the completion of all tests the Langley airplane was returned to the Smithsonian shops, where R. Luther Reed, who was in charge of the construction work of the original machine, carefully restored the parts that had been broken or marred in the crashes of 1903 and the tests at Hammondsport. Every one who ever knew Mr. Reed will be prepared to take his oath that no power in heaven or earth could have persuaded him to alter, even by so much as a flyspeck, any detail of the original design.

After the machine was restored it was turned over to the National Museum where it has since been on exhibition.

Mr. Wright objects to the label, which reads: "Original Langley flying machine, 1903 . The first man-carrying aeroplane in the history of the world capable of sustained free flight. Invented, built and tested over the Potomac River by Samuel Pierpont Langley in 1903. Successfully flown at Hammondsport, N. Y., June 2, 1914. Dimensions: 55 feet long, 48 feet wide; sustaining wing surface, 1,040 square feet."



Assembling the Langley "Aerodrome" at Hammondsport in 1914

I believe this label to be correct.

Dr. Walcott quoted a letter from the Wright brothers dated March 26, 1910, replying to a request for an example of the Wright machines, as saying:

"We can reconstruct the 1903 machine, with which the first flights were made at Kitty Hawk. Most of the parts are still in existence."

In the Langley label, Dr. Walcott added, the word "original" is used "in the same sense that it would be applied to the Kitty Hawk Wright machine of 1903, when restored as described by the Wright brothers' letter."

AIRPORTS AND AIRWAYS

Anderson, Iowa

By Malcolm H. McHargue

The Anderson Aircraft Manufacturing Co. are assembling 12 new two-place OX5 engines, machines of 30 ft. span and 22 ft. 6 in. length overall, with a steel fuslage. Their intention is to dispose of these under $1000. These machines are expected to have a top speed to about 85 mi./hr.

Anna's Flying Circus is now getting under way, and the "red-headed dare devil" Goldy Landis made her first jump April 26. Anna is preparing her rotary engined scout for exhibition work this season. There are three pilots on the field and the Aircraft Co. is doing a large business. Several visiting pilots have been using the Anderson Airport in the last few months.

Kalamazoo, Mich.

The P. & W. Air Service Co. are looking forward to a busy season. They have an OXX6 Standard and a photographic Avro fitted with a 120 hp. LeRhone. The cameras in use are an A1 and an L25 Eastman. They have rented a field of forty acres and expect in the near future to acquire an additional forty acres which will give them an "L" shaped field having a north and south runway of 1500 ft. and one east and west of 2000 ft. It is located south of Kalamazoo between the G. R. & I. railroad and the paved highway, two miles beyond the city limits. The field will be open about July 1 and visitors are welcome. Gasoline and oil will be available on the field.

Boise, Idaho

The Boise Chamber of Commerce have decided that Boise is to have a flying field. Their principal purpose in acting at this time is to get on the Air Mail route to the northwest. The field will be built, however, whether or not the mail contractors use it.

Two possible sites for the landing field are the oval at the race track on the state fair grounds, on property owned by Ada county, and a tract of sagebrush land east of the new station, which members pointed out would be ideal so far as atmospheric conditions are concerned, and probably would cost little.

Boise will start with an inexpensive field at first, and add all the "trimmings" as they become necessary, the meeting decided. A first-class field will not be necessary for some years, but if any kind of a field is provided aviators, both commercial and army, will make extensive use of it, whereas at present they use the transcontinental route almost exclusively.

Boston, Mass.

By Porter Adams

During the week of April 17, W. Lawrence Le Page of the Massachusetts Institute of Technology gave a very interesting radio talk through station WEEI in regard to the work of the Aerial Forest Fire Patrol. It is a subject especially interesting to the residents of Maine, New Hampshire and Vermont, and his talk should do much to cause some definite action to be taken in regard to aerial patrol in those states.

It is reported that in Portland, Me., there has been a corporation formed known as the Maine Airways, Inc., of which William Alexander of Portland is president. He is now said to be in Norfolk, Va., where he is negotiating for the purchase of another plane and according to the announcement the officials of the Maine Airways, Inc., stated that they were contracting for two or three additional pilots to be on hand at all times during the summer. They expect to arrange a definite system of rates for various landing places in and out of the state and will be ready to take any passengers to these desired spots. They have purchased a flying field at Stroudwater, near Portland, and are all ready constructing runways.

Lieut. Leigh Wade, pilot of the Boston on the World Flight, returned to Boston on Saturday, April 25, when he showed the films and told the story of the world flight at the Cadet Armory. Wade also talked twice over the radio, and in the evening broadcast a message of good wishes to Miss Marjorie Putnam, sister of Dave Putnam the famous ace who was killed during the war. Miss Putnam is ill in a hospital and reported that she received Wade's message clearly on the receiving set beside her bed.

It is with deep regret that we report that the first serious accident which has occurred at the Boston Airport since its official opening in September, 1923, occurred on Saturday, May 2, when Lieut. A. Vernon Macauley of the Massachusetts National Guard crashed from a height of about 150 ft. and received injuries from which he died a few hours later. Lieutenant Macauley was just leaving the airport to take part in the Army and Navy Air demonstration which preceded the award of the trophy donated by the directors of the Army and Navy Club of Boston to the service pilot operating either from the Boston Airport or from the Squantum Naval Air Station who had the greatest number of hours during the past year without serious injury to property or personnel. The trophy was won by Lieut. R. D. Thomas, U.S.N.R.F., of the Naval Reserve Air Station at Squantum, Mass., with a total flying time of 424 hr., although it was recognized that Lieut. James H. Doolittle of the Army had flown about 25 hr. more than Thomas, but much of this time was made away from Boston and the deed of gift provided that only flying time made locally shall count. The second best time was made by Lieut. Frank Crowley of the Air Service Reserve with 187 hr. and Chief Aviation Pilot Edwing G. Frank of the Navy received third place with 184 hr. It is expected that the directors of the Army and Navy Club of Boston will award a similar trophy annually and in this connection it has been suggested that the name be changed to the Macauley trophy in memory of Lieutenant Macauley.

The Crosscup-Pishon Post of the American Legion of which Lieut. Leigh Wade is the honorary commander, is putting on a huge society boxing carnival on June 5 for the benefit of the American Legion endowment fund, and it is expected that Wade will be back at that time. It is also planned to have a military and naval demonstration with formation flying precede the bouts of the evening.

Monmouth, Ill.

An aerial map of the city of Springfield and surrounding territory is being made by Hugh Engelbrecht and Associates, Peoria air photographers, and John C. Livingston, pilot of the Mid-West Airways Corp. of this city.

The Standard plane owned by the local flying corporation will be used for the work. The machine, when it was overhauled last winter, was remodeled to make it possible to take pictures through the floor of the front cockpit, where Mr. Engelbrecht rides. All of the work is done at an altitude of 9600 ft.

By employing the use of the airplane survey, the Springfield Sanitary District can have an exceedingly accurate map, showing all buildings, roads and other features on the surface of the ground, completed in a very few weeks.

Some photographic work was done last fall by Mr. Livingston and Mr. Engelbrecht. Several contracts have already been completed this spring, including pictures of factories in various parts of Illinois and adjoining states. One of the recent jobs was making a map of land over which an electric power transmission line was to be constructed, which made it much easier to determine just where the line should run and over whose property it was to be constructed.

Additional work is in sight for this summer that promises to keep the Standard busy for a number of days each month

Spokane, Wash.

By E. H. Partridge

Orders to quit all flying operations until parachutes are received were issued May 6 to all officers of the National Guard Aerial Unit. No reason for the order, which started its official course at Washington, D. C., was given Maj. Jack Fancher, head of the Unit. Unless "chutes" can be borrowed from some other unit, planes of the organization may be kept in the hangars until July 1 or thereabout.

Since printing of specifications, local fliers have lost interest in bidding for a government contract for carrying mail from Pasco, Wash., to Elko, Nev. Doubt is expressed as to whether sufficient revenue could be drawn to cover operating expense.

Fliers in the National Guard Unit have been doing some solo work, their first since war time. Instructors enjoyed watching the experts of former days trying to land the ships far above the ground surface. Lieut. Nick B. Mamer and Capt. E. A. Easterbrook have been doing the teaching.

Fort Worth, Tex.

By E. L. Maxwell

Jubilee Flying Field is one of Fort Worth's safest and most active fields with Howard Woodall, a well known and competent mechanic and pilot in full charge. Repairs and services are of the best and the field being high and dry it is never muddy. Visitors are charged no storage under thirty days, and always find a hearty welcome. The writer of the April 20 news item was asked five dollars per month storage, as he did not buy gas on the field. He left trying to take Jubilee Field with him, after crashing his ship into a fence in his sixth solo. The owners of Jubilee Field are charging no rent, but asking five dollars per month for storage after thirty days.

Australian Air Mail

Important extensions of existing aerial mail services in Australia are being planned by the Commonwealth Government Vice Consul Haskell E. Coates reports. It was announced early in January, 1925, that approval had been given for an alteration of the agreement with Queensland and Northern Territorial Aerial Services (Ltd.) to provide for an extension from Cloncurry to Duchess and Comooweal (all in Queensland). A branch for the new silver-lead mining district of Mount Isa (Queensland) is also contemplated.

It is understood that an extension of the Western Australian service, now operating from Perth to Derby (Western Australia), will be made to Wyndham (Western Australia) and to Darwin (Northern Territory) during 1925. The existing agreement between the Federal Government and Western Australia Airways (Ltd.) provided for an expansion, and the cabinet has agreed to an increase in subsidy so that the responsibility of extending the service in the Northern Territory may be undertaken.

Remarkable success has attended aerial mail services in Australia, and further extensions to the remoter sections will be welcomed by travelers and settlers in the "outback."

Airway Information

The following information concerning landing fields for airplanes in the Nisqually and Cowlitz Valleys, and southward to the Columbia River in the Puget Sound area, has been received from the commanding officer, United States Fleet Aircraft Squadrons Battle fleet, V. F. Squadron 2, through the Chief of the Bureau of Aeronautics and the Chief of the Bureau of Navigation:

Tacoma Speedway.—The Tacoma Speedway is located about 7 mi. southwestward of Tacoma proper, on the main highway to Camp Lewis, and the oval race track is easily distinguishable from the air. There are two runways, one from east to west in the center of the field, the other from south to north. The prevailing wind is from the northwest. It will usually prove advisable to use the runway from east to west, as it is longer than the other. The ground is fairly hard, and the runways appear to have been made by running a tractor over the surface and slightly tearing up the ground. Do not land short of the runway when approaching from the east, as there are some long rolling lumps there that are not apparent from the air and which might take off one's landing gear. There are some slight obstructions in the field to the right and left of the runway, and it is advisable to remain on the latter.

Camp Lewis.—There are many fields available for landing at Camp Lewis, and it is hard to distinguish one from the other. From the air the barracks appear to extend on either side of the camp, from east to west, with a large flat area between. The eastern portion of this area, about 1 mi. east of the barracks, is the most advantageous landing place. There are several lots there any one of which is as good as the other; all are smooth, and, if carefully looked over from the air, any one should prove satisfactory. A temporary T was placed in one of the lots but whether or not it remains can not be stated. The prevailing wind is from the northwest and the approaches are excellent from all sides. The approach from the east is most commonly used.

Centralia.—Anderson's field, at Centralia, is an extremely long pasture extending north and south, about 1¼ mi. southward of the town and about 300 yd. westward of the railroad tracks connecting Centralia and Chehalis. It is easily picked up by flying south along the railroad tracks until the southwestern Washington fair grounds and race track is reached, just eastward of the tracks, when Anderson's field will be found due west and about 300 yd. from the tracks. The field is 3,500 ft. long and by far the longest field in the vicinity; it is covered with thickly matted grass and is smooth and excellent for landing on any portion of it. The field is bordered on the north by small trees and bushes; on the east by some telegraph wires, trees, and bushes; on the south by small trees, and on the west by a rail fence and dirt road. Just off the field to the southwest is a house and a large barn, and on the northwest corner there is a house. The prevailing wind is from the northwest, and the best approach is from the south.

Approximate position, 46° 42′ N., 123° 00′ W.

Chehalis.—Donohue Field, at Chehalis, is located approximately 2 mi. north of the town, and is approximately 1,600 ft. square. On the north it is bordered by a rail fence and some small trees extending from the western edge about one-quarter of the way along the northern edge; on the east by a rail fence; on the south by a fence, and on the west by telegraph wires. A house stands on the northwestern corner, and a road extends across the field from northwest to southwest. This road may be taxied over without danger or the wheels may be put down after the road has been crossed and there still will be sufficient room to land. There is some slightly swampy ground in the northeastern portion of the field, with three large trees in the same vicinity. The rest of the field is fairly hard. The prevailing wind is from the northwest. The best approach is from the southeast heading diagonally across the field for the northwestern corner. The field is used as an airplane landing field, and, although no T is displayed, there is usually one civilian plane in the field, which makes it easily distinguishable from the air. The landing of Government planes there is encouraged.

Approximate position, 46° 40′ N., 123° 00′ W.

Longview.—The field at Longview is located about ¾ mi. southward of the business section of the town and about ½ mi. westward of the Cowlitz River. The field is oblong in shape, with the best approaches from the east and west, respectively, and is marked by a T. Two sets of telegraph wires extend along the eastern edge of the field; a drainage canal and some shrubbery form the northern border; a road and a rail fence are on the western edge, with some small shrubbery on the south. Some small shacks are in the southeast corner. The prevailing winds are from the northwest. The best approach is from the east over the first set of telegraph wires and under the second. There is ample room under the wires and between the poles, and no trouble will be encountered in using this approach. The field is approximately 1,000 ft. long and covered with grass.

The Standard Oil Co., or the Union Oil Co., both of which maintain agencies in Longview, will care for all needs as regards gas, oil, water, or other additional services which may be needed.

(N. A. 4, 1925.)

She carried 200 lb. of mail, the first air mail ever transported to Porto Rico.

She left Mayaguez at 10:17 a. m., May 6, for a flight over the Virgin Islands.

After having flown completely around the Island of Porto Rico and across to the Virgin Islands, the Los Angeles returned to Mayaguez at 6:15 p. m., circled over the bay and was moored again to the mast of the tender Patoka. The weather conditions were ideal throughout the flight, which was made at the request of Captain Williams, Naval Governor of the Virgin Islands.

Bringing with her two passengers taken aboard at Mayaguez, Porto Rico, in addition to her crew of thirty-seven officers and men as well as two sacks of mail, the Los Angeles arrived over the Naval Air Station at Lakehurst at 3:10 a. m., May 10, and 3 hr. later was safely housed in the hangar.

Capt. George W. Steele, the commander, said the trip to Porto Rico and return had been an unqualified success and that the Los Angeles had demonstrated that she was well able to withstand almost any weather conditions.

The Los Angeles left Mayaguez at 1:30 p. m., May 8, the return trip taking 37 hr. 40 min., almost 6 hr. longer than the time on the journey down. This was because on the return trip Captain Steele flew to the Florida coast instead of taking an air line, so that citizens along the Atlantic seaboard could have their first opportunity of seeing the airship.

It was found necessary to release 40,000 cu. ft. of helium gas in landing the Los Angeles. Several car loads of helium are en route from Texas, more than enough to refill the Los Angeles and the Shenandoah, which has been idle since last fall.

Arctic Expedition Notes

With all members of the Naval personnel who will take part in the exploration of the Arctic basin by aircraft this summer assembled and assigned to specific duties, detailed plans and preparations have progressed with considerable speed during the past week.

The assembling of equipment and the formulation of plans has been directed by Lieut. Comdr. R. E. Byrd, U.S.N., from the Navy Department. After reporting for duty to Lieutenant Commander Byrd the Naval members of the expedition have been detailed to various points in connection with the preparation of supplies and equipment and the work of completing the airplanes to be used.

Chief Boatswain E. E. Reber, U.S.N., has been designated as assembly and construction officer of the flight detail and has been sent to the Navy Yard Philadelphia where all material will be assembled under his supervision.

Lieut. M. A. Schur, U.S.N., has been assigned as engineer officer of the flight division and will have particular cognizance over engineering supplies and spare parts for the planes.

Lieutenant Commander Byrd in addition to general supervision of the aviation preparation for the expedition is giving particular attention to the aerial navigation features. Byrd was assigned to this phase of preparation for the trans-Atlantic flight in 1919 and at that time developed a sextant for use in aircraft navigation which has been standard equipment in aviation units in the Navy for the past six years. The Byrd sextant, as it has been named, makes use of a bubble to supply an artificial horizon. It may therefore be used to take sights of the sun from aircraft at any altitude and is independent of the existence of a natural horizon. The area of operations of the Navy planes in the Arctic will extend between the magnetic north pole and the geographical north pole. In this area the navigators of the expedition will have the novel experience of making their calculations with the compass needle pointing south instead of north. In addition the twenty-four hours of daylight will provide a sun which never sets but which describes a circle about the observer over twenty-four hours.

The Naval pilots will make use of this natural phenomena by using a sun compass operating on the general principle of a sun dial. The sun compass will indicate the cardinal points of the compass by the shadow thrown by the sun at various times during the twenty-four hours.

When the airplanes leave their northern bases for excursions into the unknown areas of the Arctic they will be in all respects the most completely equipped and self-sustaining aircraft that have ever set out on a mission. Emergency rations in condensed form will be carried that will be capable of sustaining the fliers for thirty days away from their base. Some of the food stuffs provided will be in a form such that two spoonsful will constitute a meal. Rifles and ammunition will also be carried so that the party may be supplied with game. A small tent will be taken in one of the planes to provide shelter when away from the base and a portable boat will be stowed in each plane.

The boat was given a test by Lieutenant Commander Byrd at the Naval Air Station in Washington during the past week and demonstrated its suitability for the work that will be required of it. The boat was carried in a small seaplane in a compact bundle which occupied about one cubic foot of space. After alighting on the water in the seaplane Lieutenant Commander Byrd inflated the air chambers of the boat in a few minutes with a small hand bellows, embarked from the plane and rowed ashore. The boat weighs 10 lb. complete.

It is expected that the Loening amphibian planes will be delivered at the aviation assembly point of the expedition within the first ten days of May. From the time of their delivery until the departure to join the MacMillan party the Naval contingent will be exercised in practice flights which will simulate the conditions under which they will operate in so far as practicable.

Commander Byrd starting for shore in the collapsible air raft to be used in the Arctic

Navy Air Orders

Lt. (jg) Joseph C. Cronin det. U.S.S. West Virginia, to temp. duty Nav. Air Sta., Pensacola.

Lt. (jg) David A. Hughes det. Nav. Air Sta., Pensacola, to U.S.S. West Virginia.

Lt. (jg) George W. Meade det. Nav. Air Sta., Pensacola, to U.S.S. Galveston.

Lt. (jg) Peter M. Moncewicz det. Nav. Air Sta., Pensacola, to U.S.S. Idaho.

Lt. (jg) Bernard J. Skahill det. Nav. Air Sta., Pensacola, to U.S.S. Mississippi.

Ens. Howard B. Hutchinson det. Nav. Air Sta., Pensacola, to U.S.S. Nevada.

Lieut. Frederick Mayer det. U.S.S. Mercy to command Nav. Air Sta., Cape May.

Ens. John Conor det. Nav. Air Sta., Pensacola, to U.S.S. Toucey.

Pay Clk. John J. MacDonald det. Nav. Air Sta., Pensacola, to U.S.S. Utah.

Lt. Lester T. Hunt, det. Nav. Air Sta., Anacostia, to member Naval Mission, Brazil.

Ens. Matthew S. Q. Weiser det. Nav. Air Sta., Pensacola to U.S.S. Pennsylvania.

Ch. Pay Clerk Cecil H. Jornigan det. Rec. Ship, San Francisco, to Nav. Air Sta., Pensacola.

UNITED STATES AIR FORCES

U. S. ARMY AIR SERVICE

Anti-Aircraft Program

An intensive anti-aircraft program, designed within five months to lead to greatly increased efficiency of fire has been ordered for six regiments of Army Coast Artillery troops. The program already is effective and drills and preliminary preparations required of the six regiments for training reasons are beginning. By the end of May the fire tests themselves will be begun, and they will be continued until Oct. 1, when the tabulated results will be studied by experts. From the conclusions reached, the controversy between air and ground forces as to which possesses superior offensive power will be reassessed.

In order to make the tests complete, both from a personnel and ordnance viewpoint, instructions have been sent the six regiments to equip themselves with guns, ammunition and men to meet all requirements.

The 62d Regiment at Fort Totten, already has been recruited to full peace time strength in regards to officers and men. It will be moved to Fort Tilden for the fire experiments and will take a major place in the test program. Two thousand rounds each month have been allowed that regiment.

The allowance of 800 shells a month to the 16th Regiment, in the Philippines; the 61st, at Fort Monroe, Va.; the 63d at San Francisco; the 64th, in Honolulu, and the 65th, in Panama, is the normal issue of ammunition for Coast Artillery regiments in peace-time maneuvers.

Regimental commanders have been advised that the guns at all times during the tests shall be handled in batteries of no less than four each and that the rate of fire for each gun shall be at least fifteen shots a minute. The tests will include night and day firing.

In making their plans, the anti-aircraft officers have realized that the question of whether ground guns constitute a real defense against air attack is virtually certain to be reopened by Congress in its next session with the same force that marked its discussion at the time the Sixty-eighth Congress adjourned. From the tests to be made in the meantime it is believed reports can be prepared which will substantially answer the problem. They feel confident also that the six regiments will attain in the five months practice a degree of marksmanship against aerial targets that will surpass anything of the sort yet accomplished.

The tests were ordered in accordance with the directions given recently by Secretary Weeks. At that time the Secretary contended it was impossible to estimate the comparative merits of ground guns and aircraft in their defensive and offensive roles. Spreading as they do over a wide range of territory geographically, the forthcoming tests are expected to provide unusually comprehensive data.

Army Air Orders

Sgt. Dale F. Allen, A.S., transferred from 99th Obs. Squad. to A.S. Tech. Sch., Chanute Field.

Sgt. Fred L. Rule, A.S., Chanute Field to Bolling Field.

First Lieut. Wendell H. Brookley, A.S., McCook Field, to Brooks Field.

First Lieut. Victor E. Bertrandias, A.S., Langley Field, to McCook Field.

First Lieut. St. Clair Streett, A.S., Washington to Langley Field.

First Lieut. Thomas H. Chapman, A.S., Kelly Field to San Antonio A. Int. Dep., San Antonio.

Capt. Idwal H. Edwards, A.S., Middletown, Pa., to Washington.

First Sgt. Addison R. Jones, A.S., France Field, Canal Zone, retired.

Spec. Or. 274, amended to assign Capt. William E. Farthing, A.S., to Langley Field instead of Mitchel Field.

Sec. Lieut. Ira Milton Jones, A.S.R., Milwaukee, to active duty, McCook Field, reverting to inactive status June 7.

Capt. John G. Whitesides, A.S., A. S. Technical Sch., to Commanding Off., Langley Field.

First Lieut. Barney M. Giles, A.S., Kelly Field, to Fairfield.

First Lieut. Harry H. Mills, A.S., Fairfield, to San Francisco, sailing Sept. 3 for Philippine Islands.

First Lieut. Milo McCune, A.S., to Fairfield, upon completion of foreign service.

U. S. NAVAL AVIATION

Naval Aviation Uniform

A new uniform has been authorized for Naval Aviation, marking a wide departure from the present attire, and it will be worn when flying, working with aircraft and when in temporary aviation camps.

The uniform will be of kersey material, the same as that now used for the Marine Corps enlisted men. It will be of forest green like that of the marines in Winter, and khaki in Summer. It will include a single-breasted coat with roll collar, breeches which button from the knee down, russet puttees and shoes, and with the stars in black silk and the stripes indicating rank in black mohair. The shirt will be of khaki with soft collar. A black tie will be worn and the cap will be of the present design except that the cloth top will be of the same goods as the uniform.

The Los Angeles Cruise

The airship Los Angeles was taken from her hangar at 8:30 p. m. April 27 and made fast to the mast shortly after 10 o'clock. After a delay of a week owing to unfavorable weather conditions, first at Lakehurst and afterward at Porto Rico, she left the Naval Air Station at Lakehurst at 10:45 a. m. May 3 bound for Mayaguez, Porto Rico.

The Naval tender Patoka had been anchored in Mayaguez harbor for a week.

The Los Angeles carried a crew of thirty-six men and four passengers. The passengers were Lieutenant Padley of the Patoka, who came up on the airship on her return from Bermuda; H. D. Ashton, Naval Bureau photographer; Col. C. G. Hall, U.S.A., training observation officer and Frank McKechnie, news reel photographer

Several Army mechanics were included in the airship's crew. Comdr. J. H. Klein, Jr., was executive officer and Lieuts. H. V. Wiley and J. C. Richardson, navigators. The others of the crew were:

Lieut. Comdr. Maurice R. Pearce and Lieuts. C. H. Havill, J. B. Carter and J. M. Thornton, watch officers; Lieut. W. Nelson, construction officer; Lieut. T. G. W. Settle and Chief Petty Officers Drier and Copeland, radio men; Lieut. Comdr. S. M. Krauss and Chief Machinist E. C. Thurman, engineering officers; Boatswain Buckey and Sergeant Brown, U.S.A., elevator men; Chief Petty Officer Steelman and Sergeant Flores, U.S.A., ruddermen; Chief Petty Officers Dean, Davis and Allen, keel riggers; Trombley and Fuogencio, cooks; Chief Petty Officers Coleman, Barton and Brooks, mechanics for relief stationed on keel. Mechanics: Engine 1, Chief Petty Officer Egli and Sergeant Barnes, U.S.A.; Engine 2, Chief Petty Officer Taylor and Sergeant Brasty, U.S.A.; Engine 3, Chief Petty Officers Miller and Jennings; Engine 4, Chief Petty Officers Fink and Kreps; Engine 5, Chief Petty Officers Moorman and Thomson.

The Los Angeles was sighted at Mayaguez, Porto Rico, at 6:19 p. m., and was moored to the mast of the tender Patoka at 7:45 p. m.

Publisher's News Letter

When we hear that our readers and advertisers have established mutually profitable relations it gives us great satisfaction. Enjoy the following burst of enthusiasm that we received in March.

"We take pleasure to inform you that as an advertising medium you are great. I am advertising in the leading aeronautical papers in the country, and in each one I have the ad keyed. I always know just how well each ad is pulling, and if the others don't snap out of it next month they're done with me. I have received from your paper six times as many inquiries as from the others combined. Why in the world don't you invite your advertisers to key their ads? A great many people don't understand what a keyed ad is. If you explained it to them and got them to try it, I venture to say that in two months or less you could convince them that it was only common sense to spend their advertising money with you."

Equally convincing was the check enclosed for future advertising.

* * * *

For some time past AVIATION has been running a Light Plane Section which we hope has stimulated interest in an important branch of aeronautics. To date no light planes in this country have been sufficiently perfected to be put on the market in a commercial way, and the magazine has received no revenue from this source. It is an interesting commentary on the more advanced development of the light plane abroad that a Dutch light plane is the first one to be advertised in the columns of AVIATION. The firm of H. Pander and Zonen of The Hague, Holland, last year turned out a very neat single-seater monoplane which has been flying very successfully for the past year. The machine is reasonably priced and according to the indicated performance it should be able to earn considerable prize money in general efficiency contests as well as in the actual light plane class.

* * * *

Encouragement of great aeronautical achievements should not be left to governments alone. Last year, some of the most interesting events were private ventures. The splendid flight of Lieut. Pelletier Doisy from Paris to Japan was a personal attempt to bring credit to the advantages of airplane transportation. Recently, the flight from England to India was partly financed by the British Aircraft Industry as will be seen from the following:

> "Mr. T. O. M. Sopwith, Chairman of the Society of British Aircraft Constructors, said that the first intimation of the flight to him came from Mr. G. R. Fairey, then chairman of the S.B.A.C. Mr. Fairey said that Sir Sefton Brancker wanted to fly to India and that the Treasury would not 'ante up,' so he himself (Mr. Fairey) guaranteed the balance of the necessary fund on behalf of the Industry.
>
> "When the proposition was put up to the Industry not a single firm wavered. Not only did all come in with their whack but others came in. DeHaviland paid more because his machine was being used and the Aircraft Disposal Company paid more because it was their engine. The Anglo-Persian Oil Company and the Wakefield Castrol people also helped."

If the American Aircraft Industry would take a more active part in promoting flights that bring distinction to its products, we would come nearer to the day when commercial aviation would begin to become an interesting outlet for the constructors products.

* * * *

The export of airplanes has been excluded from international control which it has been hoped would apply to all kinds of armament. This decision has been made by the Military, Naval and Air Committee of the International Conference on the Trade in Arms and Ammunition. The British led in the opposition to limiting the sale of aircraft to belligerents or prospective belligerents. The United States supported the successful view. It was agreed that it was practically impossible to differentiate between airplanes designed for war or commerce therefore their inclusion in the supervised list of war implements would be unreasonable. This decision appears to be a sound solution of a very complicated problem. Battleships were also excluded from the list of supervised armaments on the ground that their sale cannot be made secretly.—L.D.G.

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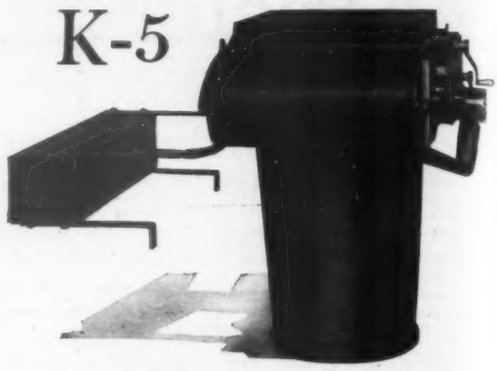

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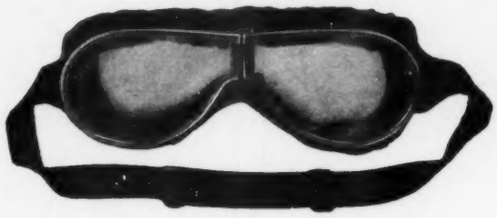

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